

Appl. No. 10/650,601
Amdt. dated 07/21/2005
Reply to Office Action of 04/25/2005

Attorney Docket No.: TS01-999
N1085-90151

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

- 1 1. (Currently Amended) A method of providing an intermediate dielectric isolated
2 silicon structure comprising the steps of:
3 forming a trench pattern on a semiconductor substrate;
4 forming a dielectric layer on the surfaces of said trench pattern;
5 forming a heavily doped buried p⁺ layer around said trench pattern;
6 exposing semiconductor surface on the bottom of said trench pattern;
7 depositing silicon to fill said trench pattern;
8 forming buried porous silicon layer around said filled trench pattern;
9 oxidizing said buried porous silicon layer and forming a thin oxide over said
10 deposited silicon surface; and
11 forming ~~said~~ isolated silicon islands from said deposited silicon.
- 1 2. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said ~~trench surface is lined with~~ dielectric layer is a silicon
3 dioxide, formed using at least one of thermal oxidation, low pressure chemical vapor
4 deposition (LPCVD) ~~and/or~~ and plasma enhanced CVD.
- 1 3. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 2, wherein said silicon dioxide liner thickness is approximately between 1000 °A
3 and 2000 °A.
- 1 4. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 1, wherein said heavily doped buried p⁺ layer is formed by implanting B⁺ ions with
3 a dose of approximately between 10¹⁵ and 10¹⁶ atom/cm².

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1 5. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 4, wherein said buried p⁺ layer depth is approximately between 4000 °A and 6000
3 °A.

1 6. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 1, wherein said silicon film filling the trench is selective epitaxial silicon.

1 7. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 6, wherein, said selective epitaxial film is deposited using methods of
3 at least one of molecular beam epitaxy, low pressure CVD, plasma enhanced CVD, and
4 and/or liquid phase epitaxy.

1 8. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 1, wherein said buried porous silicon layer is formed with anodic etching process
3 comprising:
4 etching bath composition: 10% - 40% HF
5 current density: 10 - 60 mA/cm²

1 9. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said buried porous silicon layer is oxidized at
3 approximately between 850 and 1050 °C to form an isolating silicon layer.

1 10. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 9, wherein said isolating silicon dioxide layer ~~has~~ and said dielectric
3 layer have a combined thickness of approximately between 4000 °A and 6000 °A.

1 11. (Currently Amended) The method of forming dielectric isolated silicon structure
2 according to claim 1, wherein said forming isolated silicon islands comprises removing
3 said thermal thin oxide on epitaxial silicon layer is removed to expose said silicon

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4 islands[, with] using at least one of chemical mechanical polishing, wet, ~~and/or~~ and
5 plasma etching methods.

1 12. (Currently Amended) A method of forming intermediate silicon dioxide isolated
2 epitaxial silicon structure comprising the steps of:

3 forming a hard mask stack of silicon dioxide and silicon nitride on a single crystal
4 silicon substrate;

5 forming a trench pattern in said single crystal silicon substrate;

6 forming a silicon dioxide layer on the surfaces of said trench pattern;

7 forming a heavily doped buried p⁺ layer around said trench pattern;

8 reactive ion etching said silicon dioxide layer on said trench pattern surfaces to
9 expose single crystal silicon at trench bottom, leaving oxide liner on the walls of said
10 trench pattern;

11 depositing selective epitaxial silicon to fill said trench pattern;

12 removing said hard mask stack;

13 forming a resist pattern to fully mask said filled trench;

14 forming buried porous silicon layer around said filled trench;

15 oxidizing said buried porous silicon layer and forming a thin oxide over said
16 epitaxial silicon surface; and

17 forming epitaxial silicon islands by removing said thin oxide layer from top of said
18 epitaxial silicon surface, using at least one of ~~with~~ chemical mechanical polishing, wet
19 etching methods, and/or and plasma etching methods.

1 13. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said silicon dioxide liner thickness is approximately between 1000 °A
3 and 2000 °A.

1 14. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said heavily doped, buried p⁺ layer is formed by implanting B⁺ ions
3 with a dose of approximately between 10¹⁵ and 10¹⁶ atom/cm².

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1 15. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 14, wherein said buried p⁺ layer depth is approximately between 4000 °A and
3 6000 °A.

1 16. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said buried porous silicon layer is formed with anodic etching process
3 comprising:
4 etching bath composition: 10% - 40% HF
5 current density: 10 – 60 mA/cm²

1 17. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 12, wherein said buried porous silicon layer is oxidized at approximately between
3 850 and 1050 °C.

1 18. (Original) The method of forming dielectric isolated silicon structure according to
2 claim 17, wherein said isolating silicon dioxide layer has a thickness of approximately
3 between 4000 °A and 6000 °A.

1 19. (Withdrawn) A silicon-dioxide isolated epitaxial silicon structure comprising:
2 epitaxial silicon filled trenches in silicon substrate and
3 isolated buried silicon dioxide layer surrounding said epitaxial silicon islands or
4 regions.

1 20. (Withdrawn) The silicon-dioxide epitaxial silicon structure according to claim 19,
2 wherein said isolating silicon dioxide layer has a thickness of approximately between
3 4000 and 6000 °A.